

# SQ, SQE

Installation and operating instructions





# SQ, SQE

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# Declaration of conformity

## GB: EC declaration of conformity

We, Grundfos, declare under our sole responsibility that the products SQ and SQE, to which this declaration relates, are in conformity with these Council directives on the approximation of the laws of the EC member states:

- Machinery Directive (2006/42/EC).  
Standard used: EN 809: 2009.
- Low Voltage Directive (2006/95/EC).  
Standards used: EN 60335-1: 2002 and EN 60335-2-41: 2003.
- EMC Directive (2004/108/EC).  
Standards used: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 and EN 61000-3-3: 1995.

## CZ: ES prohlášení o shodě

My firma Grundfos prohlašujeme na svou plnou odpovědnost, že výrobky SQ a SQE, na něž se toto prohlášení vztahuje, jsou v souladu s ustanoveními směrnice Rady pro sblížení právních předpisů členských států Evropského společenství v oblastech:

- Směrnice pro strojní zařízení (2006/42/ES).  
Použitá norma: EN 809: 2009.
- Směrnice pro nízkonapěťové aplikace (2006/95/ES).  
Použitá normy: EN 60335-1: 2002 a EN 60335-2-41: 2003.
- Směrnice pro elektromagnetickou kompatibilitu (EMC) (2004/108/ES).  
Použitá normy: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 a EN 61000-3-3: 1995.

## DE: EG-Konformitätserklärung

Wir, Grundfos, erklären in alleiniger Verantwortung, dass die Produkte SQ und SQE, auf die sich diese Erklärung bezieht, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften des EU-Mitgliedstaates übereinstimmen:

- Maschinenrichtlinie (2006/42/EG).  
Norm, die verwendet wurde: EN 809: 2009.
- Niederspannungsrichtlinie (2006/95/EG).  
Normen, die verwendet wurden: EN 60335-1: 2002 und EN 60335-2-41: 2003.
- EMV-Richtlinie (2004/108/EG).  
Normen, die verwendet wurden: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 und EN 61000-3-3: 1995.

## GR: Δήλωση συμμόρφωσης EC

Εμείς, η Grundfos, δηλώνουμε με αποκειμετικά δική μας ευθύνη ότι τα προϊόντα SQ και SQE στα οποία αναφέρεται η παρούσα δήλωση, συμμορφώνονται με τις εξής Οδηγίες του Συμβουλίου περί προσέγγισης των νομοθεσιών των κρατών μελών της ΕΕ:

- Οδηγία για μηχανήματα (2006/42/EC).  
Πρότυπο χρησιμοποιήθηκε: EN 809: 2009.
- Οδηγία χαμηλής τάσης (2006/95/EC).  
Πρότυπο χρησιμοποιήθηκαν: EN 60335-1: 2002 και EN 60335-2-41: 2003.
- Οδηγία Ηλεκτρομαγνητικής Συμβατότητας (EMC) (2004/108/EC).  
Πρότυπο χρησιμοποιήθηκαν: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 και EN 61000-3-3: 1995.

## FR: Déclaration de conformité CE

Nous, Grundfos, déclarons sous notre seule responsabilité, que les produits SQ et SQE, auxquels se réfère cette déclaration, sont conformes aux Directives du Conseil concernant le rapprochement des législations des Etats membres CE relatives aux normes énoncées ci-dessous :

- Directive Machines (2006/42/CE).  
Norme utilisée : EN 809 : 2009.
- Directive Basse Tension (2006/95/CE).  
Normes utilisées : EN 60335-1 : 2002 et EN 60335-2-41 : 2003.
- Directive Compatibilité Electromagnétique CEM (2004/108/CE).  
Normes utilisées : EN 55014-1 : 2006, EN 55014-2 : 1997, EN 61000-3-2 : 2006 et EN 61000-3-3 : 1995.

## BG: EC декларация за съответствие

Ние, фирма Grundfos, заявяваме със пълна отговорност, че продуктите SQ и SQE, за които се отнася настоящата декларация, отвелят на следните указания на Съвета за уძняване на правните разпоредби на държавите членки на ЕС:

- Директива за машините (2006/42/EC).  
Приложен стандарт: EN 809: 2009.
- Директива за нисковoltови системи (2006/95/EC).  
Приложени стандарти: EN 60335-1: 2002 и EN 60335-2-41: 2003.
- Директива за електромагнитната съвместимост (2004/108/EC).  
Приложени стандарти: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 и EN 61000-3-3: 1995.

## DK: EF-overensstemmelseserklæring

Vi, Grundfos, erklærer under ansvar at produkterne SQ og SQE som denne erklæring omhandler, er i overensstemmelse med disse af Rådets direktiver om indbyrdes tilnærrelse til EF-medlemsstaternes lovgivning:

- Maskindirektivet (2006/42/EF).  
Anvendt standard: EN 809: 2009.
- Lavspændingsdirektivet (2006/95/EF).  
Anvendte standarder: EN 60335-1: 2002 og EN 60335-2-41: 2003.
- EMC-direktivet (2004/108/EF).  
Anvendte standarder: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 og EN 61000-3-3: 1995.

## EE: EL vastavusesdeklaratsioon

Meie, Grundfos, deklareerime enda ainuvastutusel, et tooted SQ ja SQE, mille kohta käesolev juhend kääb, on vastavuses EÜ Nõukogu direktiividega EMU liikmesriikide seaduste ühitarimise kohta, mis käsitlevad:

- Masinate ohutus (2006/42/EC).  
Kasutatud standard: EN 809: 2009.
- Madalpinge direktiiv (2006/95/EC).  
Kasutatud standardid: EN 60335-1: 2002 ja EN 60335-2-41: 2003.
- Elektromagnetiline ühilduvus (EMC direktiiv) (2004/108/EC).  
Kasutatud standardid: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 ja EN 61000-3-3: 1995.

## ES: Declaración CE de conformidad

Nosotros, Grundfos, declaramos bajo nuestra entera responsabilidad que los productos SQ y SQE, a los cuales se refiere esta declaración, están conformes con las Directivas del Consejo en la aproximación de las leyes de los Estados Miembros del EM:

- Directiva de Maquinaria (2006/42/CE).  
Norma aplicada: EN 809: 2009.
- Directiva de Baja Tensión (2006/95/CE).  
Normas aplicadas: EN 60335-1: 2002 y EN 60335-2-41: 2003.
- Directiva EMC (2004/108/CE).  
Normas aplicadas: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 y EN 61000-3-3: 1995.

## HR: EZ izjava o uskladenosti

Mi, Grundfos, izjavljujemo pod vlastitom odgovornošću da je proizvod SQ i SQE, na koji se ova izjava odnosi, u skladu s direktivama ovog Vijeća o usklajivanju zakona država članica EU:

- Direktiva za strojeve (2006/42/EZ).  
Korištena norma: EN 809: 2009.
- Direktiva za niski napon (2006/95/EZ).  
Korištene norme: EN 60335-1: 2002 i EN 60335-2-41: 2003.
- Direktiva za elektromagnetsku kompatibilnost (2004/108/EZ).  
Korištene norme: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 i EN 61000-3-3: 1995.

**IT: Dichiarazione di conformità CE**

Grundfos dichiara sotto la sua esclusiva responsabilità che i prodotti SQ e SQE, ai quali si riferisce questa dichiarazione, sono conformi alle seguenti direttive del Consiglio riguardanti il riaffaccinamento delle legislazioni degli Stati membri CE:

- Direttiva Macchine (2006/42/CE).  
Norma applicata: EN 809: 2009.
- Direttiva Bassa Tensione (2006/95/CE).  
Norme applicate: EN 60335-1: 2002 e EN 60335-2-41: 2003.
- Direttiva EMC (2004/108/CE).  
Norme applicate: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 e EN 61000-3-3: 1995.

**LV: EK paziņojums par atbilstību prasībām**

Sabiedrība GRUNDFOS ar pilnu atbilstību dara ziņāmu, ka produkti SQ un SQE, uz kuriem attiecas šīs paziņojums, atbilst šādām Padomes direktīvām par tuvināšanos EK dalībvalstu likumdošanas normām:

- Mašīnbūves direktīva (2006/42/EK).  
Piemērotais standarts: EN 809: 2009.
- Zema sprieguma direktīva (2006/95/EK).  
Piemērotie standarti: EN 60335-1: 2002 un EN 60335-2-41: 2003.
- Elektromagnētiskās saderības direktīva (2004/108/EK).  
Piemērotie standarti: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 un EN 61000-3-3: 1995.

**HU: EK megfelelőségi nyilatkozat**

Mi, a Grundfos, egyedül felelősséggel kijelentjük, hogy a SQ és SQE termékek, amelyekre jelen nyilatkozat vonatkozik, megfelelnek az Európai Unió tagállamainak jogi irányelvét összehangoló tanács alábbi előírásainak:

- Gépek (2006/42/EK).  
Alkalmazott szabvány: EN 809: 2009.
- Kifeszültségi Direktíva (2006/95/EK).  
Alkalmazott szabványok: EN 60335-1: 2002 és EN 60335-2-41: 2003.
- EMC Direktíva (2004/108/EK).  
Alkalmazott szabványok: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 és EN 61000-3-3: 1995.

**PL: Deklaracja zgodności WE**

My, Grundfos, oświadczamy z pełną odpowiedzialnością, że nasze wyroby SQ oraz SQE, których deklaracja niniejsza dotyczy, są zgodne z następującymi wytycznymi Rady d/s ujednolicenia przepisów prawnych krajów członkowskich WE:

- Dyrektywa Maszynowa (2006/42/WE).  
Zastosowana norma: EN 809: 2009.
- Dyrektywa Niskonapięciowa (LVD) (2006/95/WE).  
Zastosowane normy: EN 60335-1: 2002 oraz EN 60335-2-41: 2003.
- Dyrektywa EMC (2004/108/WE).  
Zastosowane normy: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 oraz EN 61000-3-3: 1995.

**RU: Декларация о соответствии EC**

Мы, компания Grundfos, со всей ответственностью заявляем, что изделия SQ и SQE, к которым относится настоящая декларация, соответствуют следующим Директивам Совета Европейского союза об унификации законодательных предписаний стран-членов EC:

- Механические устройства (2006/42/EC).  
Применившийся стандарт: EN 809: 2009.
- Низковольтное оборудование (2006/95/EC).  
Применившиеся стандарты: EN 60335-1: 2002 и EN 60335-2-41: 2003.
- Электромагнитная совместимость (2004/108/EC).  
Применившиеся стандарты: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 и EN 61000-3-3: 1995.

**SK: Prehlásenie o konformite EÚ**

My firma Grundfos prehlasujeme na svoju plnú zodpovednosť, že výrobky SQ a SQE, na ktoré sa toto prehlásenie vzťahuje, sú v súlade s ustanoveniami smernice Rady pre zberanie právnych predpisov členských štátov Európskeho spoletčenstva v oblastiach:

- Smernica pre strojové zariadenie (2006/42/EC).  
Použitá norma: EN 809: 2009.
- Smernica pre nízkonapäťové aplikácie (2006/95/EC).  
Použitý normy: EN 60335-1: 2002 a EN 60335-2-41: 2003.
- Smernica pre elektromagnetickú kompatibilitu (2004/108/EC).  
Použitý normy: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 a EN 61000-3-3: 1995.

**KZ: EO сәйкестік туралы мәлімдеме**

Biz, Grundfos компаниясы, барлық жауапкершілікпен, осы мәлімдемеге қатысты болатын SQ және SQE байымдары ЕО мүші едердің заң шығарушы жарлықтарын үндестір турады мына Еуродада Кенесинің жарлықтарына сәйкес кептіндігін мәлімдейміз:

- Механикалық құрылыштар (2006/42/EC).  
Коданылған стандарт: EN 809: 2009.
- Төмөн Кернеуіл Қабдық (2006/95/EC).  
Коданылған стандарттар: EN 60335-1: 2002 және EN 60335-2-41: 2003.
- Электр магнитті үйлесімділік (2004/108/EC).  
Коданылған стандарттар: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 және EN 61000-3-3: 1995.

**LT: EB atitikties deklaracija**

Mes, Grundfos, su visa atskomybe pareiskiame, kad gaminiai SO ir SQE, kuriems skirta ši deklaracija, atitinka šias Tarybos Direktyvas dėl Europos Ekonomikos Bendrijos šalių narių [statymu suderinimo]:

- Mašinų direktyva (2006/42/EB).  
Taikomas standarts: EN 809: 2009.
- Žemų tūpumų direktyva (2006/95/EB).  
Taikomi standartai: EN 60335-1: 2002 ir EN 60335-2-41: 2003.
- EMS direktyva (2004/108/EB).  
Taikomi standartai: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 ir EN 61000-3-3: 1995.

**NL: EC overeenkomstigheidsverklaring**

Wij, Grundfos, verklaren geheel onder eigen verantwoordelijkheid dat de producten SQ en SQE waarop deze verklaring betrekking heeft, in overeenstemming zijn met de Richtlijnen van de Raad in zake de onderlinge aanpassing van de wetgeving van de EG Lidstaten betreffende:

- Machine Richtlijn (2006/42/EC).  
Gebruikte norm: EN 809: 2009.
- Laagspannings Richtlijn (2006/95/EC).  
Gebruikte normen: EN 60335-1: 2002 en EN 60335-2-41: 2003.
- EMC Richtlijn (2004/108/EC).  
Gebruikte normen: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 en EN 61000-3-3: 1995.

**PT: Declaração de conformidade CE**

A Grundfos declara sob sua única responsabilidade que os produtos SQ e SQE, aos quais diz respeito esta declaração, estão em conformidade com as seguintes Directivas do Conselho sobre a aproximação das legislações dos Estados Membros da CE:

- Directiva Máquinas (2006/42/CE).  
Norma utilizada: EN 809: 2009.
- Directiva Baixa Tensão (2006/95/CE).  
Normas utilizadas: EN 60335-1: 2002 e EN 60335-2-41: 2003.
- Directiva EMC (compatibilidade electromagnética) (2004/108/CE).  
Normas utilizadas: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 e EN 61000-3-3: 1995.

**RO: Declarație de conformitate CE**

Noi, Grundfos, declarăm pe propria răspundere că produsele SQ și SQE, la care se referă această declaratie, sunt în conformitate cu aceste Directive de Consiliu asupra armonizării legilor Statelor Membre CE:

- Directiva Utilaje (2006/42/CE).  
Standard utilizat: EN 809: 2009.
- Directiva Tensiune Joasă (2006/95/CE).  
Standarde utilizate: EN 60335-1: 2002 și EN 60335-2-41: 2003.
- Directiva EMC (2004/108/CE).  
Standarde utilizate: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 și EN 61000-3-3: 1995.

**SI: ES izjava o skladnosti**

V Grundfosu s polno odgovornostjo izjavljamo, da so naši izdelki SQ in SQE, na katere se ta izjava nanaša, v skladu z naslednjimi direktivami Sveta o prilagajevanju zakonodaje za izenačevanje pravnih predpisov držav članic ES:

- Direktiva o strojih (2006/42/ES).  
Uporabljena norma: EN 809: 2009.
- Direktiva o nizki napetosti (2006/95/ES).  
Uporabljeni normi: EN 60335-1: 2002 in EN 60335-2-41: 2003.
- Direktiva o elektromagnetni združljivosti (EMC) (2004/108/ES).  
Uporabljeni normi: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 in EN 61000-3-3: 1995.

**FI: EY-vaatimustenmukaisuusvakuutus**

Me, Grundfos, vakuutamme omalla vastuullamme, että tuotteen SQ ja SQE, joita tämä vakuutus koskee, ovat EY:n jäsenvaltioiden lainsäädännön yhdenmukaistamiseen tähänävien Euroopan neuvoston direktiivien vaatimusten mukaisia seuraavasti:

- Komedirektiivi (2006/42/EY).
- Sovellettu standardi: EN 809: 2009.
- Pienjännitedirektiivi (2006/95/EY).
- Sovellettavat standardit: EN 60335-1: 2002 ja EN 60335-2-41: 2003.
- EMC-direktiivi (2004/108/EC).
- Sovellettavat standardit: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 ja EN 61000-3-3: 1995.

**TR: EC uygunluk bildirgesi**

Grundfos olarak bu beyannameye konu olan SQ ve SQE ürünlerinin, AB Üyesi Ülkelerin kanunlarını birbirine yaklaştırma üzerine Konsey Direktifleriyle uyumlu olduğunun yalnızca bizim sorumluluğumuz altında olduğunu beyan ederiz:

- Makineler Yönetmeliği (2006/42/EC).
- Kullanılan standart: EN 809: 2009.
- Düşük Voltaj Yönetmeliği (2006/95/EC).
- Kullanılan standartlar: EN 60335-1: 2002 ve EN 60335-2-41: 2003.
- EMC Direktifi (2004/108/EC).
- Kullanılan standartlar: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 ve EN 61000-3-3: 1995.

**SE: EG-försäkran om överensstämmelse**

Vi, Grundfos, försäkrar under ansvar att produkterna SQ och SQE, som omfattas av denna försäkran, är i överensstämmelse med rådets direktiv om inbördes närmända till EU-medlemsstaternas lagstiftning, avseende:

- Maskindirektivet (2006/42/EG).
- Tillämpad standard: EN 809: 2009.
- Lågspänningdirektivet (2006/95/EG).
- Tillämpade standarder: EN 60335-1: 2002 och EN 60335-2-41: 2003.
- EMC-direktivet (2004/108/EG).
- Tillämpade standarder: EN 55014-1: 2006, EN 55014-2: 1997, EN 61000-3-2: 2006 och EN 61000-3-3: 1995.

Bjerringbro, 17th February 2011



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# English (GB) Installation and operating instructions

## Original installation and operating instructions.

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### Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.



### Warning

The use of this product requires experience with and knowledge of the product.



Persons with reduced physical, sensory or mental capabilities must not use this product, unless they are under supervision or have been instructed in the use of the product by a person responsible for their safety. Children must not use or play with this product.

## 1. Symbols used in this document

### Warning

If these safety instructions are not observed, it may result in personal injury!



**Caution** If these safety instructions are not observed, it may result in malfunction or damage to the equipment!

### Note

Notes or instructions that make the job easier and ensure safe operation.

## 2. General

On page 341 of these installation and operating instructions, you will find copies of the pump and motor nameplates.

Before the SQ/SQE pump is lowered into the borehole, this page should be filled in with the relevant nameplate data.

These installation and operating instructions must be kept in a dry place near the installation site for reference purposes.

### 2.1 Applications

The SQ and SQE pumps are designed for pumping thin, clean, non-aggressive, non-explosive liquids, not containing solid particles or fibres.

Typical applications:

- Groundwater supply for
  - private housing
  - small waterworks
  - irrigation systems in for instance green houses.
- Liquid transfer in tanks.
- Pressure boosting.

The **SQE-NE** pumps are designed for pumping thin, clean, non-explosive liquids, not containing solid particles or fibres.

These pumps are suitable for pumping contaminated or hydrogen-carbonate containing groundwater, e.g. from

- dumps
- chemical depots
- industrial areas
- oil and petrol filling stations
- environmental applications.

The **SQE-NE** pumps can also be used for sampling and monitoring and to some extent for incorporation in water treatment systems.

#### Information applying to all pump types

The maximum sand content of the water must not exceed 50 g/m<sup>3</sup>. A larger sand content will reduce the life of the pump and increase the risk of blocking.

**Note**

**If liquids with a viscosity higher than that of water are to be pumped, please contact Grundfos.**

#### pH values

SQ and SQE: 5 to 9.

SQE-NE: Please contact Grundfos.

#### Liquid temperature

The temperature of the pumped liquid must not exceed 35 °C.

### 3. Technical data

#### Supply voltage

1 x 200-240 V - 10 %/+ 6 %, 50/60 Hz, PE.

Operation via generator: As a minimum, the generator output must be equal to the motor P<sub>1</sub> [kW] + 10 %.

#### Starting current

The motor starting current is equal to the highest value stated on the motor nameplate.

#### Power factor

PF = 1.

#### Motor liquid

Type SML 2.

#### Motor cable

1.5 m, 3 x 1.5 mm<sup>2</sup>, PE.

#### Liquid temperature

Maximum 35 °C.

#### Pump outlet size

SQ 1, SQ 2, SQ 3: Rp 1 1/4.

SQ 5, SQ 7: Rp 1 1/2.

#### Pump diameter

74 mm.

#### Borehole diameter

Minimum 76 mm.

#### Installation depth

Maximum 150 m below static water level.  
See also section 6.8.2 *Installation depths*.

#### Net weight

Maximum 6.5 kg.

### 3.1 Storage

Storage temperature: -20 °C to +60 °C.

#### 3.1.1 Frost protection

If the pump has to be stored after use, it must be stored on a frost-free location or it must be ensured that the motor liquid is frost-proof.

The motor must not be stored without being filled with motor liquid.

### 3.2 Sound pressure level

The sound pressure level of the pump is lower than the limiting values stated in the EC Council Directive 2006/42/EC relating to machinery.

## 4. Preparation

Grundfos MS 3 and MSE 3 submersible motors have water-lubricated slide bearings. No additional lubrication is required.

The submersible motors are factory-filled with a special Grundfos motor liquid (type SML 2), which is frost-proof down to - 20 °C and preserved to prevent the growth of bacteria.

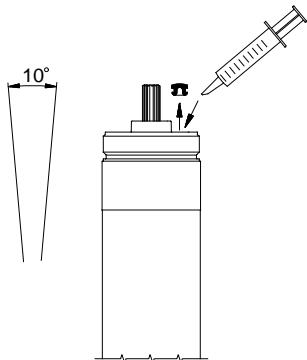
The level of motor liquid is decisive for the operating life of the bearings and consequently the life of the motor.

### 4.1 Refilling of motor liquid

If for any reason the motor liquid has been drained or lost, the motor must be refilled with Grundfos motor liquid SML 2.

To refill the motor, proceed as follows:

1. Remove the cable guard and separate the pump part from the motor.



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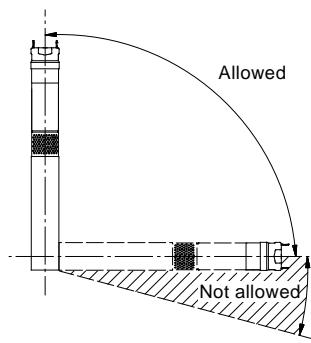
Fig. 1

2. Place the motor in vertical position with an inclination of approx. 10 °.
3. Remove the filling plug using a screwdriver or a similar tool.
4. Inject motor liquid into the motor with a filling syringe or the like.
5. To allow possible air to escape, move the motor from side to side.
6. Refit the filling plug and make sure it is tight.
7. Assemble pump part and motor.
8. Refit the cable guard.

The pump is now ready for installation.

## 4.2 Positional requirements

The pump is suitable for vertical as well as horizontal installation, however, the pump shaft **must never** fall below the horizontal plane. See fig. 2.



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Fig. 2

If the pump is to be installed horizontally, e.g. in a tank, and there is a risk that the pump might be covered by mud, it must be fitted in a flow sleeve. For installation depths, see section 6.8.2.

## 4.3 Liquid temperatures/cooling

Figure 3 shows an SQ/SQE pump installed in a borehole. The pump is operating.

Figure 3 illustrates the following:

- borehole diameter
- pump diameter
- temperature of pumped liquid
- flow past the motor to the pump suction strainer.

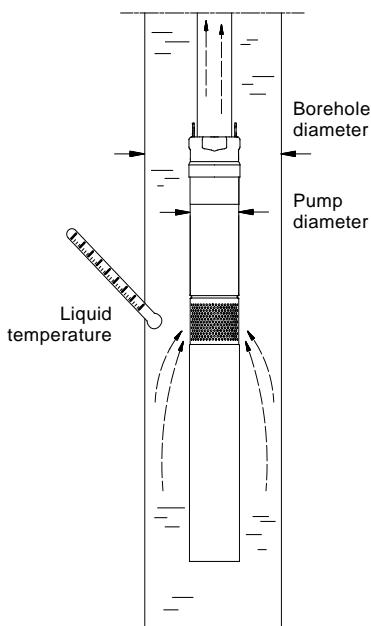


Fig. 3

To ensure sufficient cooling of the motor, it is important to observe the maximum liquid temperature of 35 °C under all conditions.

**Caution** *The borehole diameter must be at least 76 mm (approx. 3").*

The motor should always be installed above the well screen. If a flow sleeve is used, the pump may be installed freely in the borehole.

**Caution** *Do not let the pump run against a closed discharge pipe for more than 5 minutes. When the discharge pipe is closed, there is no cooling flow and there is a risk of overtemperature in motor and pump.*

If the actual temperature of the pumped liquid exceeds the specified value or the operating conditions otherwise fall outside the specified conditions, the pump may stop. Please contact Grundfos.

## 5. Electrical connection

### 5.1 General

The electrical connection should be carried out by an authorised electrician in accordance with local regulations.

#### Warning

*Before starting work on the pump, make sure that the power supply has been switched off and that it cannot be accidentally switched on.*

*The pump must be earthed.*

*The pump must be connected to an external mains switch with a minimum contact gap of 3 mm in all poles.*

*If the motor cable is damaged, it must be replaced by Grundfos, an authorised Grundfos service workshop or similarly qualified persons to avoid a hazard.*

The supply voltage, rated maximum current and power factor (PF) appear from the motor nameplate.

The required voltage for Grundfos submersible motors, measured at the motor terminals, is -10 %/+ 6 % of the nominal voltage during continuous operation (including variation in the supply voltage and losses in cables).

If the pump is connected to an electric installation where an earth-leakage circuit breaker (ELCB) is used as an additional protection, this circuit breaker **must** trip out when earth fault currents with DC content (pulsating DC) occur.

The earth leakage circuit breaker **must** be marked with the following symbol:

#### Supply voltage

1 x 200-240 V -10 %/+ 6 %, 50/60 Hz, PE.

The current consumption can only be measured by means of a true RMS instrument. If other instruments are used, the value measured will differ from the actual value.

On SQ/SQE pumps, a leakage current of 2.5 mA at 230 V, 50 Hz, can typically be measured. The leakage current is proportional to the supply voltage.

The SQE and SQE-NE pumps can be connected to a control box, type CU 300 or CU 301.

**Caution** *The pump must never be connected to a capacitor or to another type of control box than CU 300 or CU 301.*

**Caution** *The pump must never be connected to an external frequency converter.*

## 5.2 Motor protection

The motor incorporates thermal overload protection and requires no additional motor protection.

## 5.3 Connection of motor

The motor incorporates a starter device and can therefore be connected directly to the mains.

Start/stop of the pump will typically be done via a pressure switch. See fig. 4.

**The pressure switch must be rated for the maximum amps of the specific pump size.**

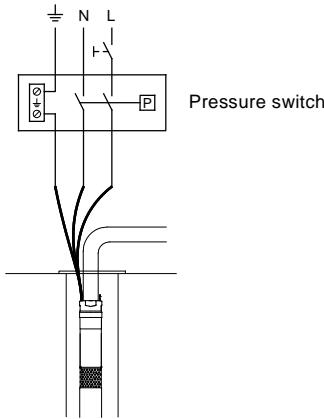


Fig. 4

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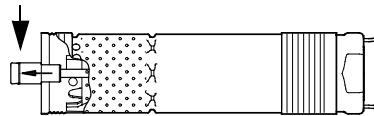
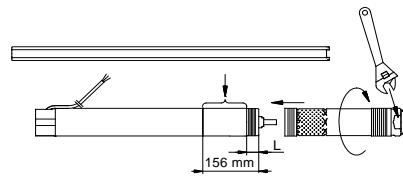


Fig. 5

- Grease the motor shaft end with the grease supplied with the motor.
- Screw the pump part on the motor (55 Nm). **Caution:** The pump shaft must engage with the motor shaft. A spanner may be used on the clamping faces of the pump part. See fig. 6.



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Fig. 6

Motor (P2) [kW]	L [mm]
0.70	120
1.15	102
1.68	66
1.85	66

When pump part and motor have been assembled correctly, there must not be a clearance between pump part and motor.

## 6. Installation

### 6.1 General

#### Warning

**Before starting any work on the pump/motor, make sure that the power supply has been switched off and that it cannot be accidentally switched on.**

**Caution** *Do not lower or lift the pump by means of the motor cable.*

The loose data plate supplied with the pump should be fixed close to the installation site.

## 6.2 Assembly of pump part and motor

To assemble pump part and motor, proceed as follows:

- Place the motor horizontally in a vice and tighten it. See fig. 6.
- Pull the pump shaft out to the position shown in fig. 5.

## 6.3 Removal of non-return valve

If a pump without non-return valve is required, the valve can be removed as follows:

- Cut off the legs of the valve guide using side-cutting pliers or a similar tool. See fig. 7.
- Turn the pump upside down.
- Check that all loose parts fall out of the pump.

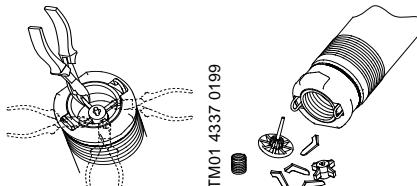


Fig. 7

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**Note** *SQE-NE is supplied without non-return valve.*

The non-return valve can be fitted in a Grundfos service workshop.

## 6.4 Fitting the cable plug to the motor

### Warning

**The motor plug must under no circumstances be removed by the user.**  
**The following description is exclusively intended for service personnel.**  
**If the motor cable is to be replaced, see section 5.1 General.**

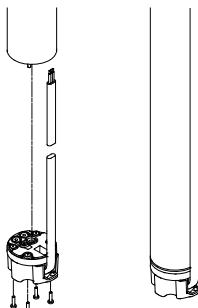


**The cable with plug must be fitted or removed by an authorised Grundfos service workshop or a similarly qualified person.**

The cable plug supplied with the motor is factory-greased. Check that the plug is greased correctly.

To fit the cable plug, proceed as follows:

1. Check that the cable is of the correct type, cross-section and length.
2. Check that the mains on the location has correct connection to earth.
3. Check that the motor socket is clean and dry. Make sure that the loose gasket has been fitted.
4. Press the cable plug onto the motor socket. The plug cannot be fitted wrongly. See fig. 8.



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Fig. 8

5. Fit and tighten the four screws (1 - 1.5 Nm). See fig. 8.

When the plug has been fitted, there must not be a clearance between the motor and the cable plug.

## 6.5 Fitting the cable guard

To fit the cable guard, proceed as follows:

1. Make sure that the submersible drop cable lies flat in the cable guard.
2. Place the cable guard in the groove in the cable plug. The two flaps of the cable guard must engage with the upper edge of the pump sleeve. See fig. 9.

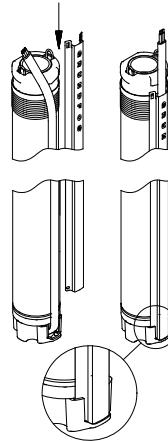


Fig. 9

3. Fasten the cable guard to the pump suction strainer with the two self-tapping screws supplied. See fig. 10.



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Fig. 10

## 6.6 Cable sizing

Grundfos can supply submersible drop cables for any type of installation.

**Caution** *The cross-section of the submersible drop cable must be large enough to meet the voltage requirements specified in section 5.1 General.*

The table values below are calculated from the following formula:

$$q = \frac{I \times 2 \times 100 \times PF \times L \times \rho}{U \times \Delta U}$$

where

$q$  = Cross-section of submersible drop cable [mm<sup>2</sup>].

$I$  = Rated maximum current of the motor [A].

$PF$  = 1.0.

$L$  = Length of submersible drop cable [m].

$\rho$  = Specific resistance: 0.02 [Ωmm<sup>2</sup>/m].

$U$  = Nominal voltage [V].

$\Delta U$  = Voltage drop [%] = 4 %.

The 4 % voltage drop is according to IEC 3-64, HD-384 Series.

The calculation gives the following maximum cable lengths at a supply voltage of 240 V:

Motor (P2)	$I_N$	Max. cable length [m]					
		1.5 mm <sup>2</sup>	2.1 mm <sup>2</sup> / 14 AWG	2.5 mm <sup>2</sup>	3.3 mm <sup>2</sup> / 12 AWG	4 mm <sup>2</sup>	6 mm <sup>2</sup>
[kW]	[A]						
0.7	5.2	80	112	133	176	213	320
1.15	8.4	50	69	83	109	132	198
1.68	11.2	37	52	62	82	99	149
1.85	12	35	49	58	76	92	139

## 6.7 Fitting the submersible drop cable

It is recommended to join the submersible drop cable and the motor cable by means of a Grundfos cable termination kit, type KM.

Cable termination kit, type KM	
Cross-sectional area	Product number
1.5 to 2.5 mm <sup>2</sup>	96021462
4.0 to 6.0 mm <sup>2</sup>	96021473

For larger cross-sections, please contact Grundfos.

## 6.8 Pipework connection

If a tool, e.g. a chain pipe wrench, is used when the riser pipe is fitted to the pump, the pump must only be gripped by the pump discharge chamber.

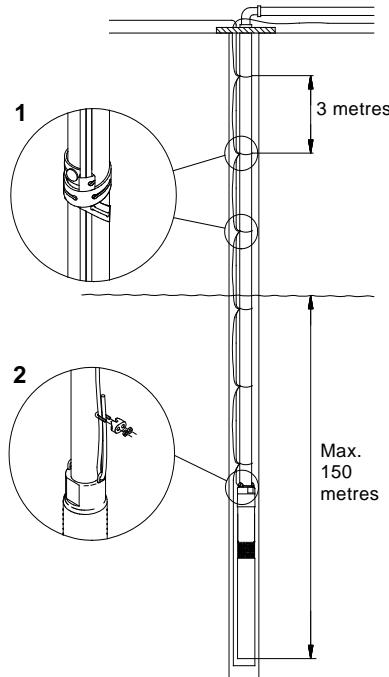
**When connecting plastic pipes**, a compression coupling should be used between the pump and the first pipe section.

**Note**  
*For pumps fitted with plastic pipes, the expansion of the pipes when loaded should be taken into consideration, when deciding on the installation depth of the pump.*

**Where flanged pipes are used**, the flanges should be slotted to take the submersible drop cable.

Figure 11 shows a pump installation with indication of:

- position of cable clips, pos. 1, and distance between the clips.
- fitting of straining wire, pos. 2.
- maximum installation depth below the static water level.



### 6.8.1 Cable clips

Cable clips must be fitted every 3 metres.

See fig. 11.

**When connecting plastic pipes**, some slackness must be left between each cable clip as plastic pipes expand when loaded.

**Where flanged pipes are used**, the cable clips should be fitted above and below each joint.

### 6.8.2 Installation depths

**Maximum** installation depth below the static water level: 150 metres. See fig. 11.

**Minimum** installation depths below the dynamic water level:

• **Vertical installation:**

During start-up and operation, the pump must always be completely submerged in water.

• **Horizontal installation:**

The pump must be installed and run at least 0.5 metres below the dynamic water level.

If there is a risk that the pump might be covered by mud, the pump must always be fitted in a flow sleeve.

### 6.8.3 When lowering the pump into the borehole

It is recommended to secure the pump by an unloaded straining wire. See fig. 11, pos. 2.

Slacken the straining wire so that it becomes unloaded and lock it to the borehole seal by means of wire locks.

**Caution**  
*The straining wire must not be used for pulling the pump with riser pipe out of the borehole.*

**Caution**  
*Do not lower or lift the pump by means of the motor cable.*

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Fig. 11

## 7. Start-up

Make sure that the well is capable of yielding a minimum quantity of water corresponding to the pump capacity.

Do not start the pump until it is completely submerged in the liquid.

Start the pump and do not stop it until the pumped liquid is completely clean, as otherwise the pump parts and the non-return valve may choke up.

## 8. Operation

### 8.1 Minimum flow rate

To ensure the necessary cooling of the motor, the pump flow rate should never be set to a value lower than 50 l/h.

If the flow rate suddenly falls, the reason might be that the pump is pumping more water than the borehole can yield. The pump must be stopped and the fault corrected.

**Caution** *The pump dry-running protection is effective only within the recommended duty range of the pump.*

### 8.2 Selection of diaphragm tank and setting of precharge pressure and pressure switch

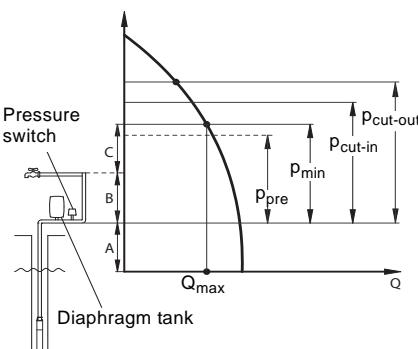


#### Warning

*The installation must be designed for the maximum pump pressure.*

As the pump has a built-in soft starter giving a run-up time of 2 seconds, the pressure at the pressure switch and diaphragm tank during starting will be lower than the pump cut-in pressure set on the pressure switch ( $p_{cut-in}$ ). This lower pressure is called minimum pressure ( $p_{min}$ ).

$p_{min}$  is equal to the desired minimum pressure at the highest tap + head and head loss in the pipe from the pressure switch and diaphragm tank to the highest tap ( $p_{min} = B + C$ ). See fig. 12.



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Fig. 12

- A: Head + head loss from dynamic water level to diaphragm tank.
- B: Head + head loss from diaphragm tank to highest tap.
- C: Minimum pressure at highest tap.

**Caution** *Make sure that the selected pump can deliver a pressure higher than  $p_{cut-out} + A$ .*

- $p_{pre}$ : Precharge pressure of diaphragm tank.
- $p_{min}$ : Desired minimum pressure.
- $p_{cut-in}$ : Cut-in pressure set on pressure switch.
- $p_{cut-out}$ : Cut-out pressure set on pressure switch.
- $Q_{max}$ : Maximum flow at  $p_{min}$ .

Using  $p_{min}$  and  $Q_{max}$ , the **minimum** diaphragm tank size, precharge pressure and pressure switch settings can be found in the guideline table below:

### Example

$p_{min} = 35$  m head,  $Q_{max} = 2.5$  m<sup>3</sup>/h.

On the basis of this information, the following values can be found in the table:

**Minimum** diaphragm tank size = 33 litres.

$p_{pre} = 31.5$  m head.

$p_{cut-in} = 36$  m head.

$p_{cut-out} = 50$  m head.

$p_{min}$ [m]	$Q_{max}$ [m <sup>3</sup> /h]																$p_{pre}$ [m]	$p_{cut-in}$ [m]	$p_{cut-out}$ [m]	
	0.6	0.8	1	1.2	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8		
Diaphragm tank size [litres]																				
25	8	8	18	18	18	18	24	33	33	50	50	50	50	80	80	80	80	22.5	26	40
30	8	8	18	18	18	24	33	33	50	50	50	50	80	80	80	80	27	31	45	
35	8	18	18	18	18	24	33	33	50	50	50	50	80	80	80	80	31.5	36	50	
40	8	18	18	18	18	24	33	50	50	50	50	80	80	80	80	80	36	41	55	
45	8	18	18	18	24	33	33	50	50	50	50	80	80	80	80	80	40.5	46	60	
50	8	18	18	18	24	33	50	50	50	50	80	80	80	80	80	80	45	51	65	
55	18	18	18	18	24	33	50	50	50	50	80	80	80	80	80	80	49.5	56	70	
60	18	18	18	18	24	33	50	50	80	80	80	80	80	80	80	80	54	61	75	
65	18	18	18	24	24	33	50	50	80	80	80	80	80	80	80	80	58.5	66	80	

1 m head = 0.098 bar.

### 8.3 Built-in protection

The motor incorporates an electronic unit which protects the motor in various situations.

In case of overload, the built-in overload protection will stop the pump for 5 minutes. After that period, the pump will attempt to restart.

If the pump has been stopped as a result of dry running, it will start automatically after 5 minutes.

If the pump is restarted and the borehole is empty, the pump will stop after 30 seconds.

Resetting of the pump: Switch off the power supply for 1 minute.

The motor is protected in case of:

- dry running
- voltage surges (up to 6000 V)  
In areas with high lightning intensity, external lightning protection is required.
- overvoltage
- undervoltage
- overload
- overtemperature.

### SQE pumps/MSE 3 motors

**Note** *Via the CU 300 or CU 301, the dry running stop limit of the MSE 3 motors can be adjusted to match the actual application.*

### 9. Maintenance and service

The pumps are normally maintenance-free.

Deposits and wear may occur. For that purpose, service kits and service tools are available from Grundfos. The Grundfos Service Manual is available on request.

The pumps can be serviced at a Grundfos service centre.

### 9.1 Contaminated pumps

**Note** *If a pump has been used for a liquid which is injurious to health or toxic, the pump will be classified as contaminated.*

If Grundfos is requested to service the pump, Grundfos must be contacted with details about the pumped liquid, etc. before the pump is returned for service. Otherwise Grundfos can refuse to accept the pump for service.

However, any application for service (no matter to whom it may be made) must include details about the pumped liquid if the pump has been used for liquids which are injurious to health or toxic.

**SQE-NE:** Only pumps that can be certified as uncontaminated, i.e. pumps containing no hazardous and/or toxic material, may be returned to Grundfos for servicing.

To prevent injury to the health of persons involved and to the environment, a document certifying that the pump is clean is required.

Grundfos must receive this certificate before the product. Otherwise, Grundfos will refuse to accept the product for servicing.

Possible costs of returning the pump are paid by the customer.

## 10. Fault finding chart



### Warning

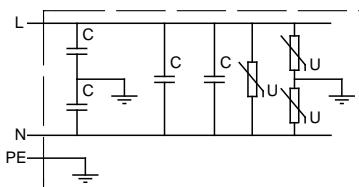
**Before starting any work on the pump/motor, make sure that the power supply has been switched off and that it cannot be accidentally switched on.**

Fault	Cause	Remedy
1. The pump does not run.	a) The fuses in the electric installation are blown.	Replace the blown fuses. If the new ones blow too, the electric installation and the submersible drop cable should be checked.
	b) The ELCB or the voltage-operated ELCB has tripped out.	Cut in the circuit breaker.
	c) No power supply.	Contact the power supply authorities.
	d) The motor protection has cut off the power supply due to overload.	Check whether the motor/pump is blocked.
	e) The pump/submersible drop cable is defective.	Repair/replace the pump/cable.
	f) Overvoltage or undervoltage has occurred.	Check the power supply.
2. The pump runs but gives no water.	a) The discharge valve is closed.	Open the valve.
	b) No water or too low water level in borehole.	See item 3 a).
	c) The non-return valve is stuck in its closed position.	Pull out the pump and clean or replace the valve.
	d) The suction strainer is choked up.	Pull out the pump and clean the strainer.
	e) The pump is defective.	Repair/replace the pump.

Fault	Cause	Remedy
3. The pump runs at reduced capacity.	a) The drawdown is larger than anticipated. b) The valves in the discharge pipe are partly closed/blocked. c) The discharge pipe is partly choked by impurities (ochre). d) The non-return valve of the pump is partly blocked. e) The pump and the riser pipe are partly choked by impurities (ochre). f) The pump is defective. g) Leakage in the pipework. h) The riser pipe is defective. i) Undervoltage has occurred.	Increase the installation depth of the pump, throttle the pump or replace it by a smaller model to obtain a smaller capacity. Check and clean/replace the valves, if necessary. Clean/replace the discharge pipe. Pull out the pump and check/replace the valve. Pull out the pump. Check and clean or replace the pump, if necessary. Clean the pipes. Repair/replace the pump. Check and repair the pipework. Replace the riser pipe. Check the power supply.
4. Frequent starts and stops.	a) The differential of the pressure switch between the start and stop pressures is too small. b) The water level electrodes or level switches in the reservoir have not been installed correctly. c) The non-return valve is leaking or stuck half-open. d) The supply voltage is unstable. e) The motor temperature gets too high.	Increase the differential. However, the stop pressure must not exceed the operating pressure of the pressure tank, and the start pressure should be high enough to ensure sufficient water supply. Adjust the intervals of the electrodes/level switches to ensure suitable time between the cutting-in and cutting-out of the pump. See installation and operating instructions for the automatic devices used. If the intervals between stop/start cannot be changed via the automatics, the pump capacity may be reduced by throttling the discharge valve. Pull out the pump and clean/replace the non-return valve. Check the power supply. Check the water temperature.

## 10.1 Megging

Megging of an installation incorporating SQ/SQE pumps is not allowed, as the built-in electronics may be damaged. See fig. 13.



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Fig. 13

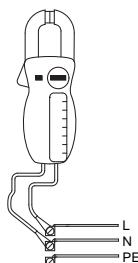
## 11. Checking the power supply



### Warning

**Before starting any work on the pump/motor, make sure that the power supply has been switched off and that it cannot be accidentally switched on.**

#### 1. Supply voltage

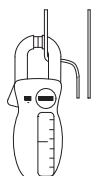


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Measure the voltage (RMS) between phase and neutral. Connect the voltmeter to the terminals at the connection.

The voltage should, when the motor is loaded, be within the range specified in section 5, *Electrical connection*. Large variations in supply voltage indicate poor power supply, and the pump should be stopped until the defect has been remedied.

#### 2. Current consumption



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Measure the current (RMS) while the pump is operating at a constant discharge head (if possible, at the capacity where the motor is most heavily loaded).

For maximum current, see nameplate.

If the current exceeds the full load current, there are the following possible faults:

- Poor connection in leads, possibly in the cable joint.
- Too low supply voltage, see item 1.

## 12. Environment

During handling, operation, storage and transport, all environment regulations dealing with the handling of hazardous materials must be observed.

### Warning

**When the pump is taken out of operation, it must be ensured that no hazardous material is left in the pump/motor and the riser pipe, which can be injurious to persons and the environment.**

In case of doubt, please contact Grundfos or the local authorities.

## 13. Disposal

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

## Appendix

## Nameplates to be filled in

<b>GRUNDFOS</b> 	
PROD.NO. _____	
_____ MODEL B P1 _____	
U: _____	50/60 Hz
I: _____ A	SINGLE PHASE
_____	
P1: _____ kW	
P2: _____ kW	
S1/35 °C	
IEC/EN 60034 Cl.1	
_____	
P2: _____ HP	
SF _____	
FLA _____	LRA _____
_____	
Ins Cl F	
PF 1.0	RPM: 10700
Weight 3.2 / 7	kg/lb
IP 68	 150m
MADE IN DENMARK	
 	 N2042

<b>GRUNDFOS</b> 	
PROD.NO. _____	
MODEL _____ P1 _____	
<b>SQ/SQE</b> _____	
Q: _____ m <sup>3</sup> /h	H: _____ m
Stages: _____	
P2 motor _____ kW	
_____	
Weight _____ kg	
MADE IN DENMARK	
 	 N2042
<b>Rp</b> _____	

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Being responsible is our foundation  
Thinking ahead makes it possible  
Innovation is the essence

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